

RECEIVED
OCT 18 2010
Nova Scotia
Utility and Review Board

CI 38943

LIN1 – Boiler Refurbishment

REDACTED

October 15, 2010

NOVA SCOTIA
POWER
An Emera Company

UARB APPROVAL SHEET

Project Title: **LIN1 - Boiler Refurbishment**

CI Number: 38943

☐ Capital Project Authorization

Head Office Use:

☒ ATO

Project Number: S595

☐ Final Cost

Date: August 30, 2010

Location:			Division:	
Expenditure Profile			Schedule	
YEAR	Budget Estimate	Project Estimate		
2010	501,583	1,658,592	Start Date	2010-05
			In-Service Date	2010-06
			Estimated Close Date	2010-08
Total	\$501,583	\$1,658,592		

COMMENTS

Approved Amount	501,583
ATO Amount	1,157,009
New Approved Amount	1,658,592

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

M/S *Sm* *Oct 6/2010*

Authorized Signatory

DATE

DATE

Mark Savory

VP Technical and Construction

CI Number : 38943-S595 - LIN1 - Boiler Refurbishment

Project Number S595

Parent CI Number : -

Cost Centre : 304 - 304-Lingan 1&2 Prod. Unit

Budget Version - UARB Submissions

	Forecast
Start :	05/01/2010
Operational :	06/30/2010
Final Cost :	08/20/2010
2010	\$1,658,592.24
Total :	\$1,658,592.24
Original Cost :	\$0.00

The scope of work for this project was to inspect, repair and replace tubes, tube bends and shields on the Unit #1 boiler.

Low Temperature Superheater (LTSH): Tube, tube bend and shield upgrades - \$350,000

The quantity of tubes, tube bends and shields to be replaced was confirmed during the detailed inspections during the Unit 1 outage in 2010. Tubes and tube bends were replaced in the areas where the thickness readings were below American Society of Mechanical Engineers (ASME) specifications. The replaced shielding will further protect the tubes from ash erosion. As well, shields with armour coating were installed in high wear locations to improve / extend tube protection.

High Temperature Superheater (HTSH) Selective tube section replacements - \$150k

The replaced High Temperature Super Heater (HTSH) tubes will mitigate risk of tube failures and forced outages.

Back Pass Division Wall - Increase to original scope - estimated at \$640K. Inspection results from late 2009 and a tube rupture in early 2010 indicated that division waterwall panel refurbishment / replacement work was also required in certain sections of the boiler.

This work has been completed.

Summary of Related CI's +/- 2 years

2008 - 31502 LIN1 - U&U LTSH Shielding and Bends Replacement \$437,390

CI Number : 38943-S595

- LIN1 - Boiler Refurbishment

Project Number S595

Parent CI Number :

-

Approved Date 5/13/2010

Cost Centre : 304

- 304-Lingan 1&2 Prod. Unit

Budget Version UARB Submissions

Capital Item Accounts

Acct	Actv	Account	Activity	Forecast Amount	Amount	Variance
094		094 - Interest Capitalized		10,336	0	10,336
095		095-Thermal & Hydro Contracts AO		90,086	0	90,086
095		095-Thermal Overtime Labour AO		651	0	651
095		095-Thermal Term Labour AO		9,788	0	9,788
095		095-Thermal Regular Labour AO		3,249	0	3,249
001	004	001 - Regular Labour (No AO)	004 - SGP - Misc.Equipment	8,373	0	8,373
001	004	001 - THERMAL Regular Labour	004 - SGP - Misc.Equipment	12,261	0	12,261
001	004	001 - THERMAL Regular Labour	004 - GP - Misc.Equipment	0	0	0
002	004	002 - THERMAL Overtime Labour	004 - SGP - Misc.Equipment	4,912	0	4,912
002	004	002 - Overtime Labour (No AO)	004 - SGP - Misc.Equipment	5,399	0	5,399
004	004	004 - Term Labour (NO AO)	004 - SGP - Misc.Equipment	7,143	0	7,143
004	004	004 - THERMAL Term Labour	004 - GP - Misc.Equipment	0	0	0
004	004	004 - THERMAL Term Labour	004 - SGP - Misc.Equipment	36,942	0	36,942
011	004	011 - Travel Expense	004 - SGP - Misc.Equipment	1,108	0	1,108
012	004	012 - Materials	004 - SGP - Misc.Equipment	82,579	0	82,579
012	004	012 - Materials	004 - GP - Misc.Equipment	0	0	0
013	004	013 - POWER PRODUCTION Contracts	004 - SGP - Misc.Equipment	1,385,760	0	1,385,760
013	004	013 - POWER PRODUCTION Contracts	004 - GP - Misc.Equipment	0	0	0
041	004	041 - Meals & Entertainment	004 - SGP - Misc.Equipment	7	0	7
041	004	041 - Meals & Entertainment	004 - DP - Misc.Equipment	0	0	0
Total Cost:				1,658,592	0	1,658,592
Original Cost:						

CI Number : 38943-S595 - LIN1 - Boiler Refurbishment
Parent CI Number : -
Cost Centre : 304 - 304-Lingan 1&2 Prod. Unit

Project Number S595
Approved Date 5/13/2010

Capital Item Justification

Justification Criteria : THERMAL
Sub-Criteria : Maintenance
Name of Report :
Document Location :
Person Responsible :

Why do this project?

This project is required to maintain the long term reliability of the boiler and mitigate the risk of unplanned outages due to LTSH, HTSH and division wall tube leaks.

Why do this project now?

Some of the tubes to be inspected and replaced are difficult to access and sufficient time during a planned outage is required to complete repairs or replacements. A planned outage is necessary to undertake inspection of the boiler tubes to confirm the sections to be repaired and replaced. The planned outage for Unit 1 in 2010 is of sufficient duration to complete inspection and repair or replacement of the boiler tubes, tube bends and shields.

Why do this project this way?

The work will be completed in the most cost effective manner to extend the life of the LTSH, HTSH and division wall. By replacing the tubes, tube bends and shields, the risk of tube leaks and unplanned outages to the Unit 1 boiler will be reduced. Based on boiler life cycle assessments these upgrades are necessary to increase boiler life expectancy.

CI Number : 38943-S595 - LIN1 - Boiler Refurbishment
Parent CI Number : -
Cost Centre : 304 - 304-Lingan 1&2 Prod. Unit

Project Number S595
Approved Date 5/13/2010

Reason for Variance / Over Expenditure / Final Costing

14954263

The original project scope in 2010 ACE was based primarily on replacement and repairs of LTSH and HTSH tubing.

Boiler inspection results from late 2009 indicated that tube repairs were required in the division wall, and a tube failure, which caused a tube leak, was experienced in January of 2010. The variance for the Division Wall scope work is \$640,000.

The boiler survey completed during the outage identified various deficiencies, including a tube failure, which caused a tube leak, in the LTSH and HTSH that warranted refurbishment in order to reduce risk of tube leaks and unplanned outages going forward. A tube leak in the LTSH was experience in the first quarter of 2010. The work originally planned for the HTSH and LTSH sections of the boiler required greater effort than originally estimated due to increased ash erosion in various locations. This refurbishment work was necessary to extend the boiler life and availability.

Variance Summary by project scope item:

	Original Estimate	Current Submission	Variance
HSTH / LTSH	\$501,585	\$1,018,585	\$517,000
Division Wall	\$0	\$640,000	\$640,000

38943 - LIN1 - Boiler Refurbishment

Account	ACE 2010	Current Submission	Variance
001 - Regular Labour (No AO)	-	8,373	8,373
001 - THERMAL Regular Labour	7,600	12,261	4,661
002 - Overtime Labour (No AO)	-	5,399	5,399
002 - THERMAL Overtime Labour	-	4,912	4,912
004 - Term Labour (NO AO)	-	7,143	7,143
004 - THERMAL Term Labour	27,540	36,942	9,402
011 - Travel Expense	-	1,108	1,108
012 - Materials	22,000	82,579	60,579
013 - POWER PRODUCTION Contracts	399,195	1,385,760	986,565
041 - Meals & Entertainment	-	7	7
094 - Interest Capitalized	9,988	10,336	348
095-Thermal & Hydro Contracts AO	25,948	90,086	64,138
095-Thermal Overtime Labour AO	-	651	651
095-Thermal Regular Labour AO	2,014	3,249	1,235
095-Thermal Term Labour AO	7,298	9,788	2,490
	501,583	1,658,592	1,157,010

Station: LINGAN GENERATING STATION

CI Number: 38943

Project: LIN1 - ATO - Boiler Refurbishment

Item	Description	Rate (\$/hr)	Qty	Cost Est	Totals
1	Regular Plant Labor				
	Plant Engineering			\$1,880	
	Mechanical Trades			\$3,200	
	Maintenance Supervision			\$2,520	
	Additional labor for extended duration and addition scope			\$23,345	
	Sub-Total Plant Resources				\$30,945
2	Term Labor				
	Utility (3 Employees for 30 days @ 8 hrs/day) staging and hole watch	27	720	\$19,440	
	Additional labor for extended duration and additional scope			\$24,645	
	Sub-Total Term Resources				\$44,085
3	Material				
	Replacement Tubes, Bends, Shields			\$10,000	
	Division Wall panels			\$58,000	
	Armoured Shields			\$14,000	
	Misc			\$579	
	Sub-Total Materials				\$82,579
4	Contracts				
	Boiler Refurb at T & M, 30 day			\$360,622	
	Boiler Refurb at T & M			\$1,025,138	
	Sub-Total Contracts				\$1,385,760
7	A/O Charges				
	Interest			\$10,336	
	Admin. Overhead			\$104,887	
	Sub-Total A/O Charges				\$115,223
	Total Project Estimate				\$1,658,592



LIN1-Boiler Refurbishment Summary of Alternatives

Budget Year : 2010
 Division : Power Production
 Department : Lingan
 Originator :

Date : 19-Jul-10
 CI Number: 38943
 Project No. :

	Alternative	After Tax WACC	PV of EVA / NPV	Rank	IRR	Disc Pay
A	Refurbish Boiler VS Do Nothing	6.55%	310,831	1	12.85%	4.7 years
B	Test 2	6.55%	0	2	#NUM!	0.0 years
C	Test 3	6.55%	0	2	#NUM!	0.0 years
D	Test 4	6.55%	0	2	#NUM!	0.0 years

Recommendation :

Proceed with Boiler Refurbishment

Notes/Comments :

Refurbish Boiler VS Do Nothing

Based on the results of the 2010 boiler survey, a significant number of locations required tube repairs / replacements and shield replacements. Also, in the first quarter there were two tube leaks reported on Unit 1. One in the Division Wall and one in LTSH. Based on the number of occurrences where tubes are at the end of their useful life and shields that are missing or degraded, it is estimated that two leaks per year would occur at 95% probability, escalating to 3 leaks in year 3 and 4 of the model. A tube leak would cause an unscheduled outage of approximately 54 hours. The total avoided cost for unscheduled tube leaks in 2010 is \$93,326 and \$452,573 in 2011.

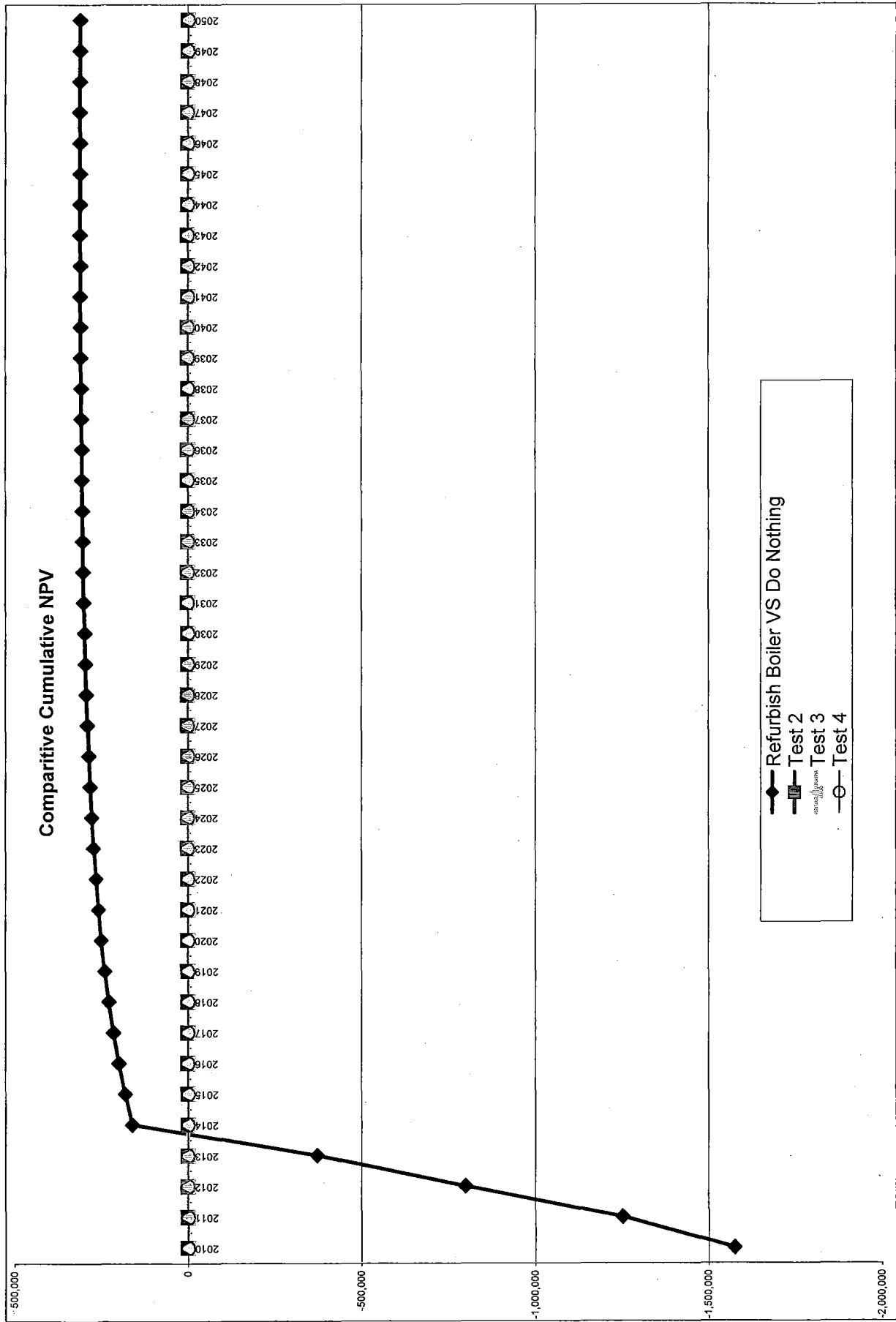
Test 2

Test 3

Test 4

LIN1-ATO-Boiler Refurbishment
Refurbish Boiler VS Do Nothing

Year	Total Revenue	Operating Costs	Capital	CCA	UCC	CFBT	Applicable Taxes	CFAT	Discount Factor	PV of CF	CNPV
2010	-	93,326.0	(1,658,592.2)	66,343.7	1,592,248.6	(1,565,266.2)	(10,487.6)	(1,575,753.8)	1.000	(1,575,753.8)	(1,575,753.8)
2011	-	452,573.0	-	127,379.9	1,464,868.7	452,573.0	(106,429.4)	346,143.6	0.939	324,865.0	(1,250,888.8)
2012	-	690,037.0	-	117,189.5	1,347,679.2	690,037.0	(177,815.2)	512,221.8	0.881	451,181.4	(799,707.5)
2013	-	701,438.0	-	107,814.3	1,239,864.8	701,438.0	(184,023.3)	517,414.7	0.827	427,738.5	(371,969.0)
2014	-	950,756.0	-	99,189.2	1,140,675.7	950,756.0	(264,182.5)	686,573.5	0.776	532,688.4	160,719.4
2015	-	-	-	91,254.1	1,049,421.6	-	28,288.8	28,288.8	0.728	20,599.0	181,318.5
2016	-	-	-	83,953.7	965,467.9	-	26,025.7	26,025.7	0.683	17,786.1	199,104.6
2017	-	-	-	77,237.4	888,230.4	-	23,943.6	23,943.6	0.641	15,357.3	214,461.9
2018	-	-	-	71,058.4	817,172.0	-	22,028.1	22,028.1	0.602	13,260.2	227,722.1
2019	-	-	-	65,373.8	751,798.2	-	20,265.9	20,265.9	0.565	11,449.4	239,171.5
2020	-	-	-	60,143.9	691,654.4	-	18,644.6	18,644.6	0.530	9,886.0	249,057.5
2021	-	-	-	55,332.4	636,322.0	-	17,153.0	17,153.0	0.498	8,536.0	257,593.4
2022	-	-	-	50,905.8	585,416.3	-	15,780.8	15,780.8	0.467	7,370.3	264,963.8
2023	-	-	-	46,833.3	538,583.0	-	14,518.3	14,518.3	0.438	6,363.9	271,327.6
2024	-	-	-	43,086.6	495,496.3	-	13,356.9	13,356.9	0.411	5,494.9	276,822.5
2025	-	-	-	39,639.7	455,856.6	-	12,288.3	12,288.3	0.386	4,744.5	281,567.0
2026	-	-	-	36,468.5	419,388.1	-	11,305.2	11,305.2	0.362	4,096.6	285,663.6
2027	-	-	-	33,551.0	385,837.0	-	10,400.8	10,400.8	0.340	3,537.2	289,200.8
2028	-	-	-	30,867.0	354,970.1	-	9,568.8	9,568.8	0.319	3,054.2	292,255.0
2029	-	-	-	28,397.6	326,572.5	-	8,803.3	8,803.3	0.300	2,637.1	294,892.1
2030	-	-	-	26,125.8	300,446.7	-	8,099.0	8,099.0	0.281	2,277.0	297,169.1
2031	-	-	-	24,035.7	276,410.9	-	7,451.1	7,451.1	0.264	1,966.1	299,135.1
2032	-	-	-	22,112.9	254,298.1	-	6,855.0	6,855.0	0.248	1,697.6	300,832.7
2033	-	-	-	20,343.8	233,954.2	-	6,306.6	6,306.6	0.232	1,465.8	302,298.5
2034	-	-	-	18,716.3	215,237.9	-	5,802.1	5,802.1	0.218	1,265.6	303,564.1
2035	-	-	-	17,219.0	198,018.9	-	5,337.9	5,337.9	0.205	1,092.8	304,656.9
2036	-	-	-	15,841.5	182,177.3	-	4,910.9	4,910.9	0.192	943.6	305,600.4
2037	-	-	-	14,574.2	167,603.2	-	4,518.0	4,518.0	0.180	814.7	306,415.1
2038	-	-	-	13,408.3	154,194.9	-	4,156.6	4,156.6	0.169	703.5	307,118.6
2039	-	-	-	12,335.6	141,859.3	-	3,824.0	3,824.0	0.159	607.4	307,726.0
2040	-	-	-	11,348.7	130,510.6	-	3,518.1	3,518.1	0.149	524.5	308,250.4
2041	-	-	-	10,440.8	120,069.7	-	3,236.7	3,236.7	0.140	452.8	308,703.3
2042	-	-	-	9,605.6	110,464.1	-	2,977.7	2,977.7	0.131	391.0	309,094.3
2043	-	-	-	8,837.1	101,627.0	-	2,739.5	2,739.5	0.123	337.6	309,431.9
2044	-	-	-	8,130.2	93,496.9	-	2,520.3	2,520.3	0.116	291.5	309,723.4
2045	-	-	-	7,479.7	86,017.1	-	2,318.7	2,318.7	0.109	251.7	309,975.1
2046	-	-	-	6,881.4	79,135.7	-	2,133.2	2,133.2	0.102	217.3	310,192.4
2047	-	-	-	6,330.9	72,804.9	-	1,962.6	1,962.6	0.096	187.6	310,380.1
2048	-	-	-	5,824.4	66,980.5	-	1,805.6	1,805.6	0.090	162.0	310,542.1
2049	-	-	-	5,358.4	61,622.0	-	1,661.1	1,661.1	0.084	139.9	310,682.0
2050	-	-	-	4,929.8	56,692.3	-	1,879.2	1,879.2	0.079	148.5	310,830.5
Total	-	2,888,130.0	(1,658,592.2)	1,601,900.0	19,251,145.6	1,229,537.8	(406,552.1)	822,985.6	15.1	310,830.5	6,429,844.0



ALSTOM Project summary (by WO#)

Page: 1 of 2
7/14/2010
9:41 AM

Client: Nova Scotia Power Inc.
Site: Lingan Generating Station
Project: 41013500
Project Description: Annual Maintenance & Emergency Outages - Unit #1
PO#:
Work order: AW1-AW1
Work order description: Annual Maintenance - Unit #1
Period: Sunday, May 02, 2010 To Sunday, July 11, 2010

Group / Activity	Description	Actual Hours	Actual Cost
0100 - Labour			
AW1-0100	Supervisor		
AW1-0102	Foreman		
AW1-0200	Labourer		
AW1-0201	Safety Officer		
AW1-0202	Travel Time & Fares		
AW1-0203	Mobilization / Set-up		
AW1-0204	Assemble / Dismantle Scaffolding		
AW1-0205	Orientation		
AW1-0206	Welders Tests		
AW1-0207	Demobilization / Clean-up		
AW1-0209	Layoff Notice - Labourer & Pipefitters		
AW1-0300	Division Wall		
AW1-0301	SH-5 Safety		
AW1-0302	LTSH1 Shields		
AW1-0303	Turbine Work		
AW1-0305	Pad Welding		
AW1-0306	Cut-outs		
AW1-0307	Miscellaneous Work		
AW1-0308	Screens		
AW1-0309	Burners		
AW1-0310	Headers		
AW1-0311	Vessels		
AW1-0312	Boiler Shields		
AW1-0313	Flow Meter for Boiler Feed Pump		
AW1-0314	Blowdown Line		
			\$1,304,493.46
0400 - Outside Suppliers			
AW1-0400	Rental of Welding Equipment	.00	
AW1-0401	Rental of Scaffolding	.00	
AW1-0403	Rental of Miscellaneous Equipment	.00	
AW1-0404	Rental of Trailer	.00	
AW1-0410	Chargeable Welding Rod	.00	
AW1-0411	Safety Supplies	.00	
AW1-0412	Freight for Tools & Equipment	.00	
AW1-0413	Miscellaneous Supplies	.00	
		.00	\$64,296.74
0500 - Alstom Capital Equipment			
AW1-0500	Alstom Trucks	.00	\$6,000.00
		.00	\$6,000.00
0600 - Expenses			
AW1-0600	Expenses -	.00	\$1,505.00
AW1-0601	Expenses -	.00	\$8,198.76
AW1-0602	Expenses - Miscellaneous	.00	\$1,266.27
		.00	\$10,970.03

ALSTOM Project summary (by WO#)

Page: 2 of 2
7/14/2010
9:41 AM

Client: Nova Scotia Power Inc.
Site: Lingan Generating Station
Project: 41013500
Project Description: Annual Maintenance & Emergency Outages - Unit #1
PO#:
Work order: AW1-AW1
Work order description: Annual Maintenance - Unit #1
Period: Sunday, May 02, 2010 To Sunday, July 11, 2010

Group / Activity	Description	Actual Hours	Actual Cost
			\$1,385,760.23

①

EXECUTIVE SUMMARY REPORT

**Nova Scotia Power Incorporated
Lingan Generating Station
Unit # 1
May/June 2010 – Shutdown**

Summary

The utility boiler for Unit # 1 at Lingan Generating Station was shut down as part of the Planned Annual Maintenance in May 2010.

The major scope of work during this outage was the replacement of the Division Wall on 6 ½ floor as well as tube replacements in LTSH-1 {3 bends G-H}, {5 bends H-I}, {7 bends thru wall I Section}. There were "Armour Coated" shields replaced on the 2nd overhead tube from Plt 1-88 in LTSH-1. There were fifteen tube replacements in SH-5. The flow nozzle was replaced in the 10" feed water line. SH-5 Safety valve was replaced during this shutdown.

During this shutdown there were eight hundred seventy {870} areas for at total of two thousand seven hundred nineteen inches {2,719"} of pad welding carried out in the Upper Furnace. There were seventy-six {76} areas for at total of four hundred sixty-three inches {463"} of pad welding carried out in the Lower Furnace.

Introduction

During the May/June, 2010 shutdown, the boiler was inspected internally to determine the condition and assessment. Sections of the boiler were repaired to ensure the Unit's integrity could be maintained.

Alstom under the Supervision of [REDACTED] carried out the Non-Destructive Testing. Alstom under the Supervision of [REDACTED] carried out the repairs. [REDACTED] carried out functions as the Safety Officer. [REDACTED] carried out quality Assurance functions.

Lower Furnace

The North Waterwall was surveyed from 385'-431'. All IR's were inspected with twenty-eight areas {28} for a total of one hundred five inches {105"} identified for pad weld overlay. Areas under 0.140" at IR's were repaired.

The South Waterwall was surveyed from 385'-431. All IR's were inspected with twelve {12} areas for a total of eighty-four inches {84"} identified for pad weld overlay. Areas at IR's with wall thickness of less than 0.140" were repaired and areas with wall thickness less than 0.130" not located at IR's were repaired.

The East Waterwall was surveyed from 384'-430'. All IR's were inspected with sixteen (16) areas for a total of one hundred thirteen {113"} inches identified for pad weld overlay. Areas under 0.140" at IR's were repaired.

The West Waterwall was surveyed from 386'-430'. All IR's were inspected with ten (10) areas for a total of ninety-five inches {95"} identified for pad weld overlay. Areas under 0.140" at IR's were repaired.

Corner # 1 was inspected with no repairs required

Corner # 2 was inspected with two {2} areas for a total of twelve inches {12"} identified for pad weld overlay. Areas under 0.140" were repaired.

Corner # 3 was inspected with five {5} areas for a total of thirty-five inches {35"} identified for pad weld overlay. Areas under 0.140" were repaired.

Corner # 4 was inspected with two {2} areas for a total of sixteen inches {16"} identified for pad weld overlay. Areas under 0.140" were repaired.

All above areas were repaired and new pad welds were inspected with Color Contrast Magnetic Particle Inspection and found acceptable.

HTSH {SH-4} Plt – A Section

A survey was carried out in A Section with the following work carried out:

A-1 – Three hundred five {305} areas for a total of five hundred sixty-five inches {565"} were identified and repaired by pad weld overlay. Two {2} tube bends were replaced thru the wall in the RH Platen section. These welds were radiographed and found acceptable.

A-2 – Eleven {11} areas for a total of ninety-six inches {96"} were identified and repaired by pad weld overlay. Two tube sections were replaced due to tubes kicked out and long existing pad welds. These welds were radiographed and found acceptable.

A-3 – One hundred thirty-two {132} areas for a total of five hundred fifty-seven inches {557"} were identified and repaired by pad weld overlay.

Front Wall – There were forty-six {46} areas for a total of one hundred sixteen inches {116"} identified and repaired by pad weld overlay.

Division Wall – One hundred twenty-two {122} tubes {8 panels X 8'} were replaced on the division wall during this shutdown. Fifty-four welds were radiographed with one repair. This area was repaired, radiographed and found acceptable.

All new pads welds over 4" in length identified above were inspected with Color Contrast Magnetic Particles.

RH-Intermediate – B & B – C Sections

The RH Intermediate section was surveyed with eighty-two areas {82} for a total of one hundred thirty-two inches {132"} identified and repaired by pad weld overlay. There were also fifty-eight {58} shields identified and replaced during this shutdown.

RH-Finish – C Section

There were twenty-three areas {23} for a total of forty-eight inches {48"} identified and repaired by pad weld overlay. There were eighteen shields {18} identified and replaced during this shutdown.

HTSH-{SH-5} Finish – D Section

During this shutdown, there were fifteen {15} tube sections identified during the 2008 shutdown replaced. There were five {5} butt welds radiographed and found acceptable. In addition to tube replacements, there were ninety-six {96} areas for a total of five hundred forty-five inches {545"} identified and repaired during this shutdown. There were forty-six {46} shields identified with thirty {30} shields replaced during this shutdown.

LTSH-4 – E Section

E Section was inspected with one hundred sixty-three areas {163} for a total of four hundred eighty-six inches {486"} identified and repaired during this shutdown. There were one hundred sixty-one {161} shields identified with ninety-seven {97} shields replaced during this shutdown.

LTSH-3 – F Section

This section was surveyed with six {6} areas for a total of sixteen inches {16"} identified and repaired by pad weld overlay. One hundred thirty-seven {137} shields were identified for replacement. These shields were not replaced.

LTSH-2 – G Section

G Section was surveyed with three {3} areas for a total of three {3"} inches identified and repaired by pad weld overlay. Five {5} shields were identified for replacement. These shields were not replaced.

LTSH-2 – G Section East Side Bend Assessment

The elements were spread and three {3} bends with thickness of less than 0.100" were replaced. Due to a recent outage in Unit # 2, erosion was detected on the inside bend of the 2nd tube down on the east side of the elements. Engineering should investigate installing shields in this exposed area.

LTSH-1-2 – H-I Sections

An extensive survey was carried in LTSH Section. The major work carried out was the replacement of five {5} bends with thickness of less than 0.100". There were also seven {7} wall penetration tubes replaced during to heavy notching and low UT thickness. Butt welds outside the boiler were radiographed. There were three {3} areas for a total of sixteen inches {16"} identified and repaired by pad weld overlay. In addition to the above replacements, eighty-eight {88} shields on the 2nd overhead tube in LTSH-1 were replaced with "Armour Coated" shields.

Economizer – J Section

This section was surveyed with no mechanical work required.

Economizer – K Section

No mechanical work was required in this section.

Under Slag Fall

A visual and UT survey was carried out under the slag fall on the lower WW tubes. One area {1} for a total of three inches {3"} was identified and repaired by pad weld overlay.

Deaerator

A visual and Magnetic Particle Inspection was carried out in the Deaerator Storage vessel. All circumferential, longitudinal and attachment welds were inspected with no defects noted during this shutdown.

A visual and UT thickness survey was carried out in the Deaerator Heater vessel. There were eight areas {8} for a total of seventy-eight {78} sq inches identified and repaired by pad weld overlay. These areas were inspected with Color Contrast Magnetic Particle Inspection and found acceptable.

Steam Drum

A visual, UT and Magnetic Particle Inspection was carried out in the Steam Drum. Thickness measurements were taken on both ends of the 6" distribution line. The circumferential welds and "T" areas as well as all attachments on both head to shell welds were inspected with no defects noted. The nozzle on the north end of the drum that had been leaking was replaced with a sockolet weld cap. This weld was inspected and found acceptable.

Blow-Down Tank

A visual inspection was carried out internally in the blow-down tank. There was approximately 226" linear on the fillet weld of the shell to liner identified and repaired.

Turbine

The LP shroud was inspected with UT thickness measurements. Areas of less than 0.125" were repaired by pad weld overlay. There were eleven {11} areas for a total of thirty-six inches {36"} on the Turbine lower end identified and repaired by pad weld overlay. There were five {5} areas for a total of seventeen inches {17"} identified and repaired on the Generator lower end. There were two {2} areas for a total of five inches {5"} on the upper end of the Generator identified and repaired by pad weld overlay.

The Gland Steam lines below the shroud were inspected with UT thickness measurements. There were holes identified and repaired in the Turbine and Generator ends of the Gland Steam Lines.

The diaphragms, casings, fan blades, and bolts were inspected during this shutdown. All results were forwarded to NSPI Engineering for evaluation.

Headers

The following headers were inspected during the Annual Shutdown:

-North & South Upper Wall Headers in Penthouse – The header to stub ligaments on Rows 1-5, 57-61 and 115-119 of the North & South Upper Water-wall headers were inspected with Color Contrast Magnetic Particle Inspection. The two {2} support hangers and saddles and welds on the “T” connection were also inspected with no defects noted.

-Economizer Outlet Header in Penthouse – The header to stub ligaments on Rows 1-5, 30-35 and 83-88 of the economizer outlet header were inspected with Color Contrast Magnetic Particle Inspection. The “T” connections and hanger brackets were also inspected with no defects noted.

-SH-4 – 6th floor – The accessible header to stub ligaments on Rows 5-9, 41-46, 47-53 and 62-66 of the SH-4 header were inspected with Color Contrast Magnetic Particle Inspection. The “T” connections and four {4} support brackets were also inspected with no defects noted.

-SH-3 on 8th floor – The three {3} “T” connections and hanger brackets were inspected on SH-3 with no defects noted.

-RH-1 Header on 7th floor – The header to stub ligaments on Rows 1-3, 10-12 and 20-22 were inspected with no defects noted on RH-1 Inlet header. The support saddles, “T” connection and bottom drain were also inspected with no defects noted.

-Lower South Water-wall Header on ground – Five rows on the east and west end of the header were inspected with no defects noted.

-Lower East Water-wall Header on ground – Five rows on the north, center and south ends of the header were inspected with no defects noted.

In addition to the above inspection on headers, hand-hole caps were removed from the following headers to facilitate borescope inspection by [REDACTED]:

Lower WW - South east Corner

SH-4 - North end

RH-1 - North end

Lower Econ – South end

SH-3 – South end

Upper North WW – West end

Upper West WW – North end

Upper Econ – North end.

Stack Breeching

Visual and UT thickness surveys were carried out on Unit 1-2 Stack breeching during the Annual shutdowns. All results were forwarded to NSPI Engineering for evaluation.

High Energy Piping

A visual and Color Contrast Magnetic Particle Inspection was carried out on the three{3} circumferential welds of the Hot and Cold RH “Y” connections. No defects were noted during this inspection.

Conclusions and Recommendations

During the next Planned Shutdown, the following areas should be surveyed in addition to the normal boiler survey:

-Remove bars and screens and inspect LTSH-1 East-side bends.

-Install shields on 2nd tube down on east side of “G” Section.

-Re-do RH Finish survey carried out in 2008.

REDACTED

Generation Responses

Request IR-G21:

With respect to page 52, CI# 38943, LIN1 - Boiler Refurbishment,

a) Provide a breakdown of the estimated \$501,583 cost.

b) In order to better understand this work and the basis why a decision to capitalize the expenditure is made, please elaborate on the extent of the replacement of the tubes, tube bends and shields and explain why this is considered a capital expenditure. Is there a certain 0,10 of the total number of tubes that required replacement where NSPI would consider the work to be an O&M expense?

Response IR-G21:

a) The breakdown of the \$501,583 is as follows:

- Materials: [REDACTED]
- Power Production Contracts: [REDACTED]
- Regular Labour: \$7,600
- Term Labour: \$27,540
- Interest and A/O: \$45,248

To protect value for customers and mitigate the risk of prospective proponents having access to project budget information, the estimated costs for materials and power production contracts are confidential. All purchase orders and contracts for supply of materials and installation have not yet been issued or finalized.

REDACTED

1 Response IR-G21: (cont'd)

2
3 The more a supplier is aware of NSPI's specific requirements, the better their ability to
4 obtain the highest price, reduce competition and ultimately increase the cost for NSPI and its
5 customers.

6
7 The cost of such transparency is not always immediately evident. Information from
8 regulatory proceedings can provide competitive advantages over other suppliers, and that
9 could be advantageous in bidding or negotiation. Higher prices, or avoidable contractual
10 constraints, will result in unnecessary higher costs to customers.

11
12 b) The project scope includes inspection and evaluation in accordance with NSPI Thermal
13 Maintenance Practices TMP004 and TMP017 for the replacement of boiler tubes, tube bends
14 and shields. Please refer to Confidential Attachments 1 and 2. Tubes, tube bends and shields
15 will be replaced as necessary based on the inspection results completed during the early
16 stages of the planned Unit 1 outage in 2010. The quantity of tubes, tube bends and shields to
17 be replaced will be confirmed during the detailed inspections. Tubes and tube bends will be
18 replaced in the areas where the wall thickness measurements are less than requirements
19 specified in American Society of Mechanical Engineers (ASME) Code B31.1. Replacing the
20 shielding will further protect the boiler tubes from ash erosion. This work is similar to a
21 major capital item, which would be carried out every 10-15 years for the whole boiler
22 section. NSPI has found the approach of doing smaller sections more frequently is more
23 effective and produces similar reliability benefits.

24
25 Attachments 1 and 2, NSPI's Thermal Maintenance Practices are confidential because the
26 information included is the intellectual property of NSPI. The Company has a reasonable
27 expectation that these proprietary standards and practices will be protected from public
28 disclosure. These standards and practices have been developed over time and have
29 contributed to the reliability of NSPI's thermal generating assets.

REDACTED

1 Response IR-G21: (cont'd)

- 2
- 3 c) The items in this project scope are considered capital items as they are in compliance with
- 4 NSPI's Accounting Policy, Section 6000- Capitalization of Costs.